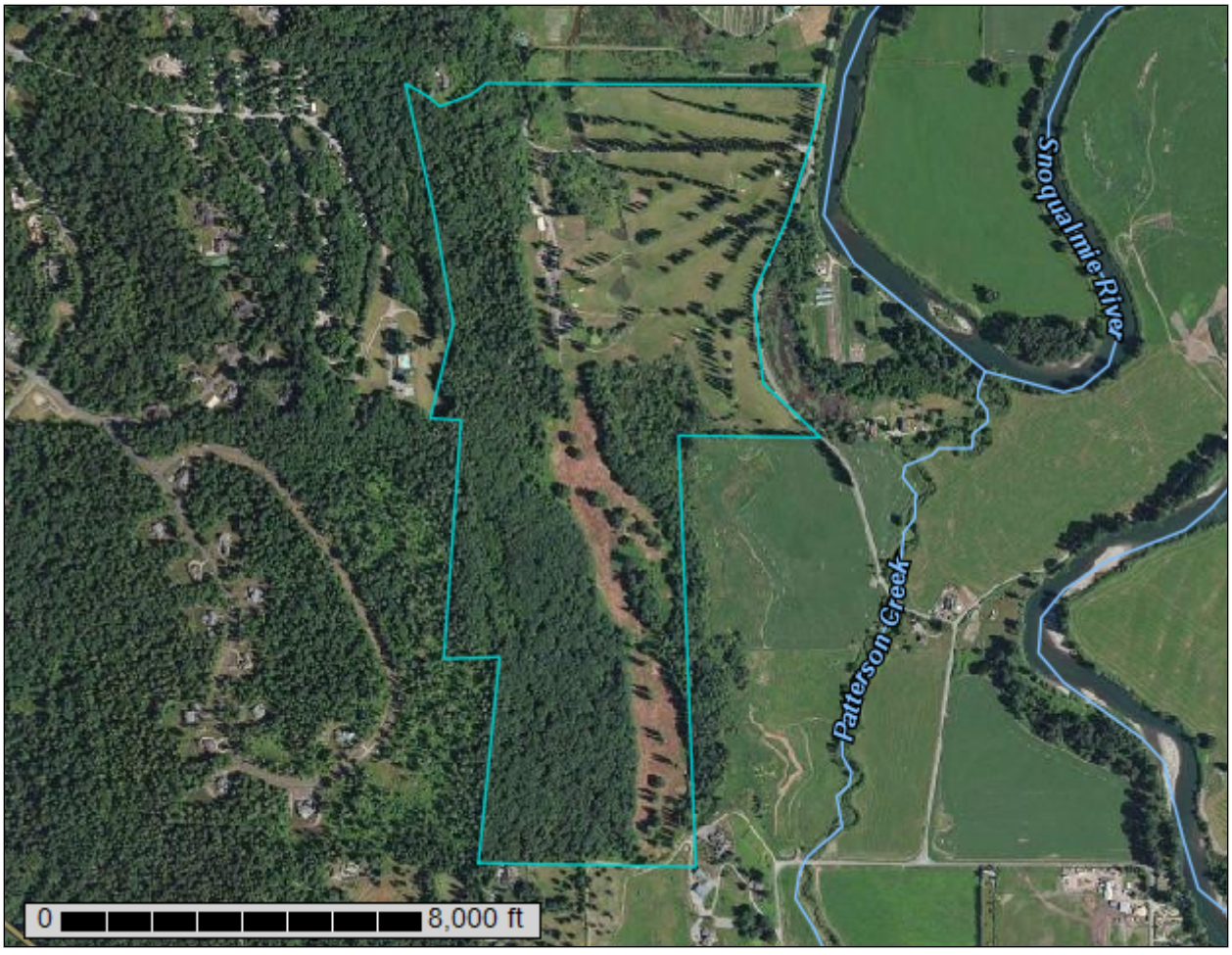
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for King County Area, Washington



July 29, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

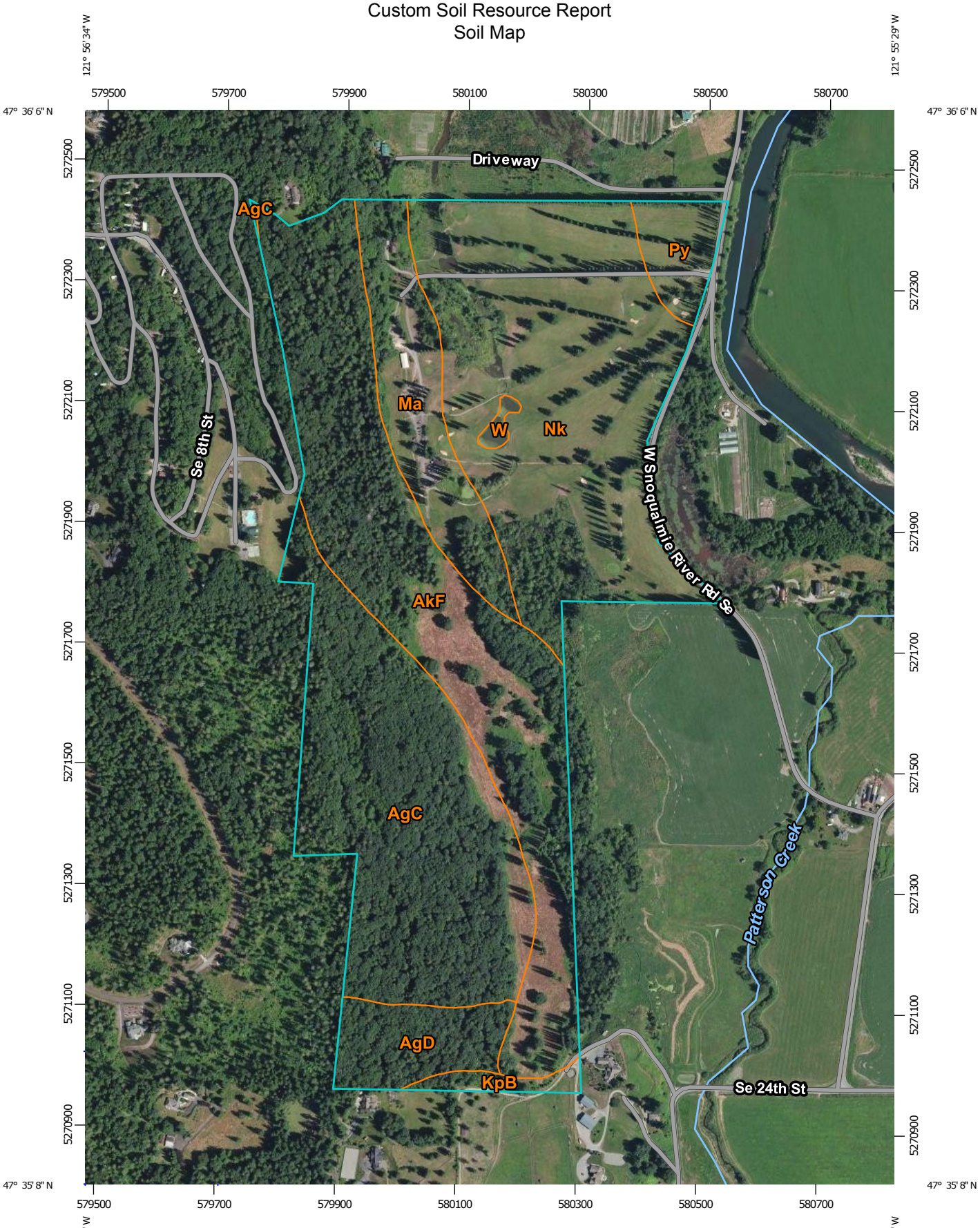
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 8, Dec 10, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2010—Aug 20, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

King County Area, Washington (WA633)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes	47.2	24.7%
AgD	Alderwood gravelly sandy loam, 15 to 30 percent slopes	8.8	4.6%
AkF	Alderwood and Kitsap soils, very steep	52.5	27.4%
KpB	Kitsap silt loam, 2 to 8 percent slopes	2.1	1.1%
Ma	Mixed alluvial land	16.5	8.6%
Nk	Nooksack silt loam	58.1	30.3%
Py	Puyallup fine sandy loam	5.4	2.8%
W	Water	0.7	0.4%
Totals for Area of Interest		**191.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been

observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

King County Area, Washington

AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes

Map Unit Setting

Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Alderwood and similar soils: 95 percent
Minor components: 5 percent

Description of Alderwood

Setting

Landform: Moraines, till plains
Parent material: Basal till with some volcanic ash

Typical profile

H1 - 0 to 12 inches: gravelly ashy sandy loam
H2 - 12 to 27 inches: very gravelly sandy loam
H3 - 27 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G002XN302WA)

Minor Components

Tukwila

Percent of map unit: 1 percent
Landform: Depressions

Norma

Percent of map unit: 1 percent
Landform: Depressions

Bellingham

Percent of map unit: 1 percent
Landform: Depressions

Shalcar
Percent of map unit: 1 percent
Landform: Depressions

Seattle
Percent of map unit: 1 percent
Landform: Depressions

AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes

Map Unit Setting
Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition
Alderwood and similar soils: 100 percent

Description of Alderwood

Setting
Landform: Moraines, till plains
Parent material: Basal till with some volcanic ash

Typical profile
H1 - 0 to 12 inches: gravelly ashy sandy loam
H2 - 12 to 27 inches: very gravelly sandy loam
H3 - 27 to 60 inches: very gravelly sandy loam

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G002XN302WA)

AkF—Alderwood and Kitsap soils, very steep

Map Unit Setting

Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 220 days

Map Unit Composition

Alderwood and similar soils: 50 percent
Kitsap and similar soils: 25 percent

Description of Alderwood

Setting

Landform: Moraines, till plains
Parent material: Basal till with some volcanic ash

Typical profile

H1 - 0 to 12 inches: gravelly ashy sandy loam
H2 - 12 to 27 inches: very gravelly sandy loam
H3 - 27 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 25 to 70 percent
Depth to restrictive feature: 24 to 40 inches to densic material
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Description of Kitsap

Setting

Landform: Terraces
Parent material: Lacustrine deposits with a minor amount of volcanic ash

Typical profile

H1 - 0 to 5 inches: ashy silt loam
H2 - 5 to 24 inches: ashy silt loam
H3 - 24 to 60 inches: stratified silt to silty clay loam

Properties and qualities

Slope: 25 to 70 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.4 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

KpB—Kitsap silt loam, 2 to 8 percent slopes

Map Unit Setting
Mean annual precipitation: 37 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 160 to 200 days

Map Unit Composition
Kitsap and similar soils: 85 percent
Minor components: 15 percent

Description of Kitsap

Setting
Landform: Terraces
Parent material: Lacustrine deposits with a minor amount of volcanic ash

Typical profile
H1 - 0 to 5 inches: silt loam
H2 - 5 to 24 inches: silt loam
H3 - 24 to 60 inches: stratified silt to silty clay loam

Properties and qualities
Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.4 inches)

Interpretive groups
Farmland classification: All areas are prime farmland
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G002XN502WA)

Minor Components

Alderwood
Percent of map unit: 10 percent

Bellingham
Percent of map unit: 3 percent
Landform: Depressions

Seattle
Percent of map unit: 1 percent
Landform: Depressions

Tukwila
Percent of map unit: 1 percent
Landform: Depressions

Ma—Mixed alluvial land

Map Unit Setting
Mean annual precipitation: 25 to 90 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 160 to 200 days

Map Unit Composition
Alluvial land, mixed, and similar soils: 99 percent

Description of Alluvial Land, Mixed

Typical profile
H1 - 0 to 8 inches: sand
H2 - 8 to 20 inches: fine sand
H3 - 20 to 60 inches: sand
H4 - 60 to 70 inches: loamy fine sand, gravelly sand
H4 - 60 to 70 inches:

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A

Nk—Nooksack silt loam

Map Unit Setting

Elevation: 0 to 500 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 180 to 200 days

Map Unit Composition

Nooksack and similar soils: 85 percent
Minor components: 15 percent

Description of Nooksack

Setting

Landform: Terraces, flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 29 inches: silt loam
H3 - 29 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 to 48 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G002XN202WA)

Minor Components

Puget

Percent of map unit: 5 percent
Landform: Depressions

Oridia
Percent of map unit: 5 percent
Landform: Depressions

Briscot
Percent of map unit: 4 percent
Landform: Depressions

Woodinville
Percent of map unit: 1 percent
Landform: Depressions

Py—Puyallup fine sandy loam

Map Unit Setting
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 170 to 200 days

Map Unit Composition
Puyallup and similar soils: 75 percent
Minor components: 25 percent

Description of Puyallup

Setting
Landform: Flood plains, terraces
Parent material: Alluvium

Typical profile
H1 - 0 to 8 inches: ashy fine sandy loam
H2 - 8 to 34 inches: very fine sandy loam
H3 - 34 to 60 inches: sand

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 48 to 60 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups
Farmland classification: All areas are prime farmland
Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Other vegetative classification: Unnamed (G002XN402WA)

Minor Components

Briscot
Percent of map unit: 8 percent
Landform: Depressions

Newberg
Percent of map unit: 6 percent
Landform: Depressions

Woodinville
Percent of map unit: 5 percent
Landform: Depressions

Oridia
Percent of map unit: 3 percent
Landform: Depressions

Nooksack
Percent of map unit: 3 percent

W—Water

Map Unit Composition
Water: 100 percent

Soil Information for Cropland

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands

Prime and other Important Farmlands–King County Area, Washington		
Map Symbol	**Map Unit Name**	**Farmland Classification**
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes	Farmland of statewide importance
AgD	Alderwood gravelly sandy loam, 15 to 30 percent slopes	Farmland of statewide importance
AkF	Alderwood and Kitsap soils, very steep	Not prime farmland
KpB	Kitsap silt loam, 2 to 8 percent slopes	All areas are prime farmland
Ma	Mixed alluvial land	Farmland of statewide importance
Nk	Nooksack silt loam	All areas are prime farmland
Py	Puyallup fine sandy loam	All areas are prime farmland
W	Water	Not prime farmland

Forage Suitability Groups

Forage suitability groups is a method of grouping soils for pasture and hayland uses. The forage suitability groups are created through the analysis of soil properties that impact species selection and species performance. The soils assigned to each group are similar enough to be suited to the same species of grasses or legumes, require similar management, have similar limitations and hazards, and have similar productivity levels and responses to management. This report displays the map unit symbol, the percent of each component, the forage suitability group identification number and the forage suitability group name assigned to each component. Contact the local Natural Resources Conservation Service office for additional information about forage suitability groups.

Report—Forage Suitability Groups

[Absence of an entry indicates that a forage suitability group has not assigned]

Forage Suitability Groups–King County Area, Washington			
Map unit symbol and soil name	**Pct. of map unit**	**Forage suitability group number**	**Forage suitability group name**
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes			
Alderwood	95	G002XN302WA	Unnamed
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes			
Alderwood	100	G002XN302WA	Unnamed
AkF—Alderwood and Kitsap soils, very steep			
Alderwood	50	—	—
Kitsap	25	—	—
KpB—Kitsap silt loam, 2 to 8 percent slopes			
Kitsap	85	G002XN502WA	Unnamed
Ma—Mixed alluvial land			
Alluvial land, mixed	99	—	—

Forage Suitability Groups–King County Area, Washington			
Map unit symbol and soil name	**Pct. of map unit**	**Forage suitability group number**	**Forage suitability group name**
Nk—Nooksack silt loam			
Nooksack	85	G002XN202WA	Unnamed
Py—Puyallup fine sandy loam			
Puyallup	75	G002XN402WA	Unnamed
W—Water			
Water	100	—	—

Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Chemical Soil Properties–King County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes								
Alderwood	0-12	30-40	—	5.1-6.0	0	0	0	0
	12-27	5.0-25	—	5.1-6.0	0	0	0	0
	27-60	5.0-25	—	5.1-6.0	0	0	0	0
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes								
Alderwood	0-12	30-40	—	5.1-6.0	0	0	0	0
	12-27	5.0-25	—	5.1-6.0	0	0	0	0
	27-60	5.0-25	—	5.1-6.0	0	0	0	0
AkF—Alderwood and Kitsap soils, very steep								
Alderwood	0-12	30-40	—	5.1-6.0	0	0	0	0
	12-27	5.0-25	—	5.1-6.0	0	0	0	0
	27-60	5.0-25	—	5.1-6.0	0	0	0	0
Kitsap	0-5	22-44	—	5.6-6.5	0	0	0	0
	5-24	22-44	—	5.6-6.5	0	0	0	0
	24-60	15-25	—	5.1-6.5	0	0	0	0
KpB—Kitsap silt loam, 2 to 8 percent slopes								
Kitsap	0-5	22-44	—	5.6-6.5	0	0	0	0
	5-24	22-44	—	5.6-6.5	0	0	0	0
	24-60	15-25	—	5.1-6.5	0	0	0	0

Chemical Soil Properties–King County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
Ma—Mixed alluvial land								
Alluvial land, mixed	0-8	2.0-15	—	5.1-7.3	0	0	0	0
	8-20	1.0-5.0	—	5.1-7.3	0	0	0	0
	20-60	0.0-3.0	—	5.1-7.3	0	0	0	0
	60-70	0.0-3.0	—	5.1-7.3	0	0	0	0
Nk—Nooksack silt loam								
Nooksack	0-11	10-15	—	5.6-6.5	0	0	0	0
	11-29	10-15	—	5.6-6.5	0	0	0	0
	29-60	5.0-10	—	5.6-6.5	0	0	0	0
Py—Puyallup fine sandy loam								
Puyallup	0-8	22-44	—	6.1-7.3	0	0	0	0
	8-34	22-44	—	6.1-7.3	0	0	0	0
	34-60	0.0-5.0	—	6.1-7.3	0	0	0	0
W—Water								
Water	—	—	—	—	—	—	—	—

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel

or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features–King County Area, Washington									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes									
Alderwood	Densic material	24-40	0-3	Noncemented	0	—	None	High	Moderate
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes									
Alderwood	Densic material	24-40	0-3	Noncemented	0	—	None	High	Moderate
AkF—Alderwood and Kitsap soils, very steep									
Alderwood	Densic material	24-40	0-3	Noncemented	0	—	None	High	Moderate
Kitsap		—	—		0	—	Low	High	Moderate
KpB—Kitsap silt loam, 2 to 8 percent slopes									
Kitsap		—	—		0	—	Low	High	Moderate
Ma—Mixed alluvial land									
Alluvial land, mixed		—	—		0	—	None	High	Moderate
Nk—Nooksack silt loam									
Nooksack		—	—		0	—	None	High	Low
Py—Puyallup fine sandy loam									
Puyallup	Strongly contrasting textural stratification	20-40	—	Noncemented	0	—	None	High	Low

Soil Features–King County Area, Washington									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
W—Water									
Water		—	—		—	—			

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely

grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes										
Alderwood	B	—	January	1.5-3.1	1.7-3.3	—	—	None	—	None
			February	1.5-3.1	1.7-3.3	—	—	None	—	None
			March	1.5-3.1	1.7-3.3	—	—	None	—	None
			April	—	—	—	—	None	—	None
			May	—	—	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	—	None
			December	—	—	—	—	None	—	None

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes										
Alderwood	B	—	January	1.5-3.1	1.7-3.3	—	—	None	—	None
			February	1.5-3.1	1.7-3.3	—	—	None	—	None
			March	1.5-3.1	1.7-3.3	—	—	None	—	None
			April	—	—	—	—	None	—	None
			May	—	—	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	—	None
			December	—	—	—	—	None	—	None

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
AkF—Alderwood and Kitsap soils, very steep										
Alderwood	B	—	January	1.5-3.1	1.7-3.3	—	—	None	—	None
			February	1.5-3.1	1.7-3.3	—	—	None	—	None
			March	1.5-3.1	1.7-3.3	—	—	None	—	None
			April	—	—	—	—	None	—	None
			May	—	—	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	—	None

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
			December	—	—	—	—	None	—	None
Kitsap	C	—	January	1.5-3.0	2.3-3.2	—	—	None	—	None
			February	1.5-3.0	2.3-3.2	—	—	None	—	None
			March	1.5-3.0	2.3-3.2	—	—	None	—	None
			April	1.5-3.0	2.3-3.2	—	—	None	—	None
			May	1.5-3.0	2.3-3.2	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	—	None
			December	1.5-3.0	2.3-3.2	—	—	None	—	None

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
KpB—Kitsap silt loam, 2 to 8 percent slopes										
Kitsap	C	—	January	1.5-3.0	2.3-3.2	—	—	None	—	None
			February	1.5-3.0	2.3-3.2	—	—	None	—	None
			March	1.5-3.0	2.3-3.2	—	—	None	—	None
			April	1.5-3.0	2.3-3.2	—	—	None	—	None
			May	1.5-3.0	2.3-3.2	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	—	None
			December	1.5-3.0	2.3-3.2	—	—	None	—	None

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
Ma—Mixed alluvial land										
Alluvial land, mixed	A	—	January	1.0-3.0	>6.0	—	—	None	Brief	Frequent
			February	1.0-3.0	>6.0	—	—	None	Brief	Frequent
			March	1.0-3.0	>6.0	—	—	None	Brief	Frequent
			April	1.0-3.0	>6.0	—	—	None	Brief	Frequent
			May	—	—	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	1.0-3.0	>6.0	—	—	None	Brief	Frequent
			December	1.0-3.0	>6.0	—	—	None	Brief	Frequent

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
Nk—Nooksack silt loam										
Nooksack	B	—	January	—	—	—	—	None	Brief	Occasional
			February	3.0-4.0	>6.0	—	—	None	Brief	Occasional
			March	3.0-4.0	>6.0	—	—	None	Brief	Occasional
			April	3.0-4.0	>6.0	—	—	None	—	None
			May	3.0-4.0	>6.0	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	Brief	Occasional
			December	—	—	—	—	None	Brief	Occasional

Water Features–King County Area, Washington										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
Py—Puyallup fine sandy loam										
Puyallup	A	—	January	—	—	—	—	None	Brief	Occasional
			February	4.0-5.0	>6.0	—	—	None	Brief	Occasional
			March	4.0-5.0	>6.0	—	—	None	Brief	Occasional
			April	4.0-5.0	>6.0	—	—	None	Brief	Occasional
			May	—	—	—	—	None	—	None
			June	—	—	—	—	None	—	None
			July	—	—	—	—	None	—	None
			August	—	—	—	—	None	—	None
			September	—	—	—	—	None	—	None
			October	—	—	—	—	None	—	None
			November	—	—	—	—	None	Brief	Occasional
			December	—	—	—	—	None	Brief	Occasional
W—Water										
Water	—	—	Jan-Dec	—	—	—	—	—	—	—

Soil Information for Forestland

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Vegetative Productivity

This folder contains a collection of tabular reports that present vegetative productivity data. The reports (tables) include all selected map units and components for each map unit. Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses, productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Forestland Productivity with Site Index Base

This table is designed to assist forestland owners or managers plan the use of soils for wood crops. It provides the potential productivity of the soils for wood crops.

Potential productivity of merchantable or *common trees* on a soil is expressed as a site index and as a volume growth rate number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. *Common trees* are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *Base Age* is the age of trees in years on which the site index is based. "TA" indicates total age. "BH" indicates breast height age. "N/A" indicates that base age is not applicable.

The *Site Index Curve Number* is listed in the National Register of Site Index Curves. It identifies the site index curve used to determine the site index.

The *Volume Growth Rate* is the maximum wood volume growth rate likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National Forestry Manual.

Forestland Productivity with Site Index Base–King County Area, Washington					
Map unit symbol and soil name	**Common trees**	**Site Index**	**Base Age**	**Site Index Curve Number**	**Volume Growth Rate (CMAI)**
		ft	*yrs*		*cu ft/ac/yr*
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes					
Alderwood	Douglas-fir	111	50 BH	King 1966 (795)	157.00
	Pacific madrone	—	—	—	—
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes					
Alderwood	Douglas-fir	111	50 BH	King 1966 (795)	157.00
	Pacific madrone	—	—	—	—
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—
AkF—Alderwood and Kitsap soils, very steep					
Alderwood	Douglas-fir	111	50 BH	King 1966 (795)	157.00
	Pacific madrone	—	—	—	—
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—
Kitsap	Douglas-fir	128	50 BH	King 1966 (795)	186.00
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—

Forestland Productivity with Site Index Base–King County Area, Washington					
Map unit symbol and soil name	**Common trees**	**Site Index**	**Base Age**	**Site Index Curve Number**	**Volume Growth Rate (CMAI)**
		ft	*yrs*		*cu ft/ac/yr*
KpB—Kitsap silt loam, 2 to 8 percent slopes					
Kitsap	Douglas-fir	128	50 BH	King 1966 (795)	186.00
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—
Ma—Mixed alluvial land					
Alluvial land, mixed	bigleaf maple	—	—	—	—
	black cottonwood	—	—	—	—
	Pacific willow	—	—	—	—
	red alder	90	50 TA	Worthington, Johnson, Staebler, Lloyd 1960 (100)	—
	western redcedar	—	—	—	—
Nk—Nooksack silt loam					
Nooksack	Douglas-fir	120	50 BH	King 1966 (795)	172.00
	red alder	—	—	—	—
	western redcedar	—	—	—	—
Py—Puyallup fine sandy loam					
Puyallup	bigleaf maple	—	—	—	—
	black cottonwood	—	—	—	—
	Douglas-fir	125	50 BH	King 1966 (795)	172.00
	red alder	—	—	—	—
	western hemlock	—	—	—	—
	western redcedar	—	—	—	—
W—Water					
Water	—	—	—	—	—

Soil Information for Hayland/ Pastureland

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Management

This folder contains a collection of tabular reports that present soil interpretations related to land management. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Rangeland Tillage, Compaction Resistance, and Soil Restoration

This table can help rangeland owners or managers plan the use of soils for range production and management. Interpretive ratings are given for the soils according to the limitations that affect various aspects of rangeland management.

The ratings are both verbal and numerical. Numerical ratings in the table indicate the degree to which individual soil properties affect the suitability of each soil for the indicated use. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the

greatest negative impact on the specified aspect of rangeland management (0.00) and the point at which the soil feature is not a limitation (1.00).

The ratings for *rangeland tillage* are based on slope, flooding, ponding, soil texture, rock fragments on or in the soil, depth to a restrictive layer, depth to a water table, and the hazard of wind erosion. The soils are described as being well suited, moderately suited, or poorly suited. A rating of *well suited* indicates that no significant limitations affect tillage operations, *moderately suited* indicates that one or more limitations can cause some difficulty, and *poorly suited* indicates that one or more limitations can make tillage operations very difficult. The overall rating class for each soil is assigned based on the product of the numerical ratings of the individual soil properties considered in the interpretation.

The ratings for *resistance to soil compaction* are based on content of rock fragments in the soil, soil texture, depth to a water table, content of organic matter, surface soil structure, and rangeland productivity. The resistance of the soils to compaction is described as high, moderate, or low. A rating of *high* indicates that the soil has features that make soil compaction unlikely. *Moderate* indicates that the soil has one or more features that could result in compaction. *Low* indicates that the soil has one or more properties that make soil compaction very likely. The overall rating class for each soil is assigned based on the product of the numerical ratings of the individual soil properties considered in the interpretation.

The ratings for *soil restoration potential* are based on precipitation, soil depth, salinity, and sodium adsorption ratio. The potential of the soils is described as high, moderate, or low. A rating of *high* indicates that the soil has soil properties that favor restoration. *Moderate* indicates that the soil has one or more properties that inhibit restoration. *Low* indicates that the soil has one or more properties that are very unfavorable to soil restoration. The overall rating class for each soil is assigned based on the product of the numerical ratings of the individual soil properties considered in the interpretation.

Report—Rangeland Tillage, Compaction Resistance, and Soil Restoration

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Rangeland Tillage, Compaction Resistance, and Soil Restoration–King County Area, Washington							
Map symbol and soil name	Pct. of map unit	Rangeland tillage		Resistance to soil compaction		Soil restoration potential	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes							
Alderwood	95	Moderately suited		Low resistance		High potential	
		Wind erosion	0.99	Vegetative productivity	0.00		
				Content of sand	0.73		
				Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.90		
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes							
Alderwood	100	Poorly suited		Low resistance		High potential	
		Slope	0.00	Vegetative productivity	0.00		
		Wind erosion	0.99	Content of sand	0.73		
				Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.90		
AkF—Alderwood and Kitsap soils, very steep							
Alderwood	50	Poorly suited		Low resistance		High potential	
		Slope	0.00	Vegetative productivity	0.00		
		Wind erosion	0.99	Content of sand	0.73		
				Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.90		
Kitsap	25	Poorly suited		Low resistance		High potential	
		Slope	0.00	Vegetative productivity	0.00		
		Wind erosion	0.99	Content of sand	0.77		
				Soil structure	0.90		
				Moderate resistance for surface structure size	0.90		
				Soil structure	0.90		

Rangeland Tillage, Compaction Resistance, and Soil Restoration–King County Area, Washington							
Map symbol and soil name	Pct. of map unit	Rangeland tillage		Resistance to soil compaction		Soil restoration potential	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KpB—Kitsap silt loam, 2 to 8 percent slopes							
Kitsap	85	Well suited		Low resistance		High potential	
				Vegetative productivity	0.00		
				Content of sand	0.77		
				Soil structure	0.90		
				Moderate resistance for surface structure size	0.90		
				Soil structure	0.90		
Ma—Mixed alluvial land							
Alluvial land, mixed	99	Poorly suited		Low resistance		High potential	
		Content of sand	0.00	Vegetative productivity	0.00		
		Wind erosion	0.00	Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.90		
				Content of rock fragments	0.96		
Nk—Nooksack silt loam							
Nooksack	85	Well suited		Low resistance		High potential	
				Vegetative productivity	0.00		
				Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.80		
				Content of rock fragments	0.92		
Py—Puyallup fine sandy loam							
Puyallup	75	Poorly suited		Low resistance		High potential	
		Wind erosion	0.00	Vegetative productivity	0.00		
				Content of sand	0.63		
				Soil structure	0.80		
				Moderate resistance for surface structure size	0.80		
				Soil structure	0.90		

Rangeland Tillage, Compaction Resistance, and Soil Restoration–King County Area, Washington							
Map symbol and soil name	Pct. of map unit	Rangeland tillage		Resistance to soil compaction		Soil restoration potential	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
W—Water							
Water	100	Not rated		Not rated		Not Rated	

Vegetative Productivity

This folder contains a collection of tabular reports that present vegetative productivity data. The reports (tables) include all selected map units and components for each map unit. Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses, productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Irrigated and Nonirrigated Yields by Map Unit Component

The average yields per acre that can be expected of the principal crops under a high level of management are shown in this table. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

If yields of irrigated crops are given, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

Pasture yields are expressed in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

The land capability classification of map units in the survey area is shown in this table. This classification shows, in a general way, the suitability of soils for most kinds of field crops (United States Department of Agriculture, Soil Conservation Service, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have slight limitations that restrict their use.
- Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.
- Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
- Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage);

s shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

Reference:
United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

Irrigated and Nonirrigated Yields by Map Unit Component–King County Area, Washington								
Map symbol and soil name	**Land capability**		**Green chop**		**Pasture**		**Sweet corn**	
	Irrigated	**Nonirrigated**	**Irrigated**	**Nonirrigated**	**Irrigated**	**Nonirrigated**	**Irrigated**	**Nonirrigated**
			Tons		*AUM*		*Tons*	
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes								
Alderwood	—	4s	—	10.00	—	4.0	—	—
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes								
Alderwood	—	4e	—	10.00	—	4.0	—	—
AkF—Alderwood and Kitsap soils, very steep								
Alderwood	—	7e	—	—	—	—	—	—
Kitsap	—	7e	—	—	—	—	—	—
KpB—Kitsap silt loam, 2 to 8 percent slopes								
Kitsap	—	3w	—	10.00	—	9.0	—	—
Ma—Mixed alluvial land								
Alluvial land, mixed	—	4w	—	—	—	4.0	—	—
Nk—Nooksack silt loam								
Nooksack	—	3w	—	—	—	13.0	—	—
Py—Puyallup fine sandy loam								
Puyallup	3w	3w	—	—	—	8.0	—	4.00
W—Water								
Water	—	—	—	—	—	—	—	—

Waste Management

This folder contains a collection of tabular reports that present soil interpretations related to waste management. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Waste management interpretations are tools designed to guide the user in evaluating soils for use of organic wastes and wastewater as productive resources. Example interpretations include land application of manure, food processing waste, and municipal sewage sludge, and disposal of wastewater by irrigation or overland flow process.

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

This table shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include saturated hydraulic conductivity (Ksat), depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include Ksat, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Report—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge–King County Area, Washington					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AgC—Alderwood gravelly sandy loam, 6 to 15 percent slopes					
Alderwood	95	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	1.00	Droughty	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Shallow to densic materials	0.74	Shallow to densic materials	0.74
		Slope	0.37	Too acid	0.67
AgD—Alderwood gravelly sandy loam, 15 to 30 percent slopes					
Alderwood	100	Very limited		Very limited	
		Slope	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slope	1.00
		Droughty	1.00	Droughty	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Shallow to densic materials	0.74	Shallow to densic materials	0.74

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge–King County Area, Washington					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AkF—Alderwood and Kitsap soils, very steep					
Alderwood	50	Very limited		Very limited	
		Slope	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slope	1.00
		Droughty	1.00	Droughty	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Shallow to densic materials	0.74	Shallow to densic materials	0.74
Kitsap	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	0.95
		Too acid	0.03	Too acid	0.14
KpB—Kitsap silt loam, 2 to 8 percent slopes					
Kitsap	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	0.95
		Too acid	0.03	Too acid	0.14
Ma—Mixed alluvial land					
Alluvial land, mixed	99	Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Droughty	0.79	Droughty	0.79
		Leaching	0.45	Too acid	0.08
Nk—Nooksack silt loam					
Nooksack	85	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
		Depth to saturated zone	0.09	Too acid	0.14
		Too acid	0.03	Depth to saturated zone	0.09

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge–King County Area, Washington					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Py—Puyallup fine sandy loam					
Puyallup	75	Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	0.60	Flooding	1.00
		Leaching	0.45	Strongly contrasting textural stratification	0.16
		Strongly contrasting textural stratification	0.16		
W—Water					
Water	100	Not rated		Not rated	

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